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EXAMINER	
CHOI, WILLIAM C	

ART UNIT	PAPER NUMBER
2873	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/825,452	MERMELSTEIN ET AL.
	Examiner	Art Unit
	William C. Choi	2873

-- The MAILING DATE of this communication appears on the cov r she t with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 May 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,14-26 and 28-34* is/are rejected.

7)☒ Claim(s) *12,13 and 27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 April 2001 & 05 June 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☒ Interview Summary (PTO-413) Paper No(s)/Mail Date. *0504*.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

The indicated allowability of claims 1-34, as discussed with attorney Charles Heiken, indicated in the attached interview summary, is withdrawn in view of the newly discovered reference(s). Rejections based on the newly cited reference(s) follow.

Claim Objections

Independent claims 1, 7, 10, 12, 18-20, 23, 24, 26-28, 30, 31, 33 and 34 (and respective dependent claims) are objected to because of the following informalities: the beginning of said claims recite, "...**said at least one surface acoustic reflective diffractive element**". Alternate claim language such as , "at least one of said... elements" implies that more than 1 element is distinctly claimed, wherein the previous claim language set forth above does not imply as such.

Therefore, applicant is encouraged to review the claims to make sure the claim language is uniform throughout in regard to the number of acoustic reflective diffractive elements being claimed and to make any appropriate corrections. The dependent claims inherit the objection from their respective parent claims.

Furthermore, in regard to line 17 of claim 23, "piece of electric substrate" should be changed to "**piezoelectric**" substrate in agreement with the disclosure.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-6, 9-11, 14-22, 24-26 and 31-34 are rejected under 35 U.S.C. 102(e) as being anticipated by Dinger et al (U.S. 2002/0009178 A1).

In regard to claim 1, Dinger et al discloses a method for spatially modulating radiation (page 1, section [0001]) comprising: directing at least one radiation beam upon a reflective surface of at least one surface acoustic wave reflective diffractive element (page 2, sections [0034]-[0036], Figure 1, "3"); and driving said at least one surface acoustic reflective diffractive element with a plurality of modulating signals to generate a plurality of independently modulated output radiation beams having parameters (page 2, section [0035] and section [0039], lines 1-4, Figures 1 and 2A, "9, 11, 13").

Regarding claim 2, the modulating signals of Dinger et al would inherently be electrical, this being reasonably assumed from the disclosure of "interdigital electrodes" (page 2, section [0034], last 2 lines).

Regarding claim 3, Dinger et al discloses wherein the driving comprises modulating the direction of the modulated output radiation beams (page 2, section [0035], Figure 1, "7, 9, 11, 13").

Regarding claims 4 and 5, the driving of Dinger et al would inherently comprise applying a plurality of separate modulating signals for each surface acoustic wave diffractive element, this being reasonably assumed from Dinger et al disclosing interdigital electrodes generating oscillations in the surface acoustic wave diffractive element (page 2, section [0034], last 2 lines) of various frequencies (page 2, section [0021], last 5 lines).

Regarding claim 6, the radiation beam directing would inherently be done with a laser, this being reasonably assumed from the radiation being disclosed as EUV radiation (page1, section [0001], lines 1-2).

Regarding claim 9, the modulated output radiation beams would inherently be directed upon photosensitive material, this being reasonably assumed from Dinger et al disclosing the method's use in lithography systems (page 2, section [0019]).

In regard to claim 10, Dinger et al discloses an apparatus for spatially modulating radiation comprising: at least one surface acoustic wave reflective diffractive element (page 2, sections [0034]-[0036], Figure 1), each element having at least one reflective surface (Figure 1, "3"), at least one transducer of surface acoustic waves (Figure 1, "5"), at least one transducer to transduce a surface acoustic wave in the surface of at least one of said surface acoustic wave reflective diffractive elements (Page 2, section [0034], Figure 1, "5") and would inherently comprise a source of a plurality of modulating signals for driving said at least one transducer, this being reasonably assumed from the surface waves being disclosed as having their frequencies varied (page 2, section 0021], last 6 lines). Dinger et al further discloses a source of at least one input radiation

beam constructed and arranged so that at least a portion of the input radiation beam strikes a reflective surface of a surface acoustic wave reflective diffractive element from outside the surface of that surface acoustic wave reflective diffractive element (Figure 1, "7"), and a plurality of modulated output radiation beams modulated by respective ones of said modulating signals (page 2, section [0035] and section [0039], lines 1-4, Figures 1 and 2A, "9, 11, 13").

Regarding claim 11, the source of radiation would inherently be a laser with a cavity, this being reasonably assumed from the radiation being disclosed as EUV radiation (page1, section [0001], lines 1-2) and cavities being inherent structural requirements for laser operation (i.e. for internal reflections).

Regarding claim 14, Dinger et al discloses wherein said at least one surface acoustic wave diffractive element has an active area (Figure 1, "3").

Regarding claim 15, Dinger et al discloses wherein the active area is piezoelectric (page 1, section [0014]).

Regarding claim 16, Dinger et al discloses wherein the active area has a reflectivity greater than zero (Figure 1, "7, 9, 11, 13").

Regarding claim 17, the active area of Dinger et al would inherently have an active area having a transmissivity greater than zero, this being reasonably assumed since some light will inherently not be reflected.

Regarding claim 21, Dinger et al discloses wherein the transducer comprises interdigital electrodes deposited on top of a piezoelectric substrate (page 2, section [0022]).

Regarding claim 22, Dinger et al discloses wherein the interdigital electrodes are regularly spaced (Figure 4, "34").

Regarding claim 32, Dinger et al discloses wherein said active area comprises at least one thin membrane (page 3, section [0046], lines 5-8).

In regard to claim 18, Dinger discloses as set forth in claim 10 and would inherently have a patterned active area in said at least one surface acoustic wave reflective diffractive element, this being reasonably assumed since any pattern, including a blank pattern, meets this limitation.

In regard to claim 19, Dinger discloses as set forth in claim 10 and further discloses wherein said active area of said at least one surface acoustic wave reflective element is on a curved surface (Figure 1, "3").

In regard to claim 20, Dinger discloses as set forth in claim 10 and further discloses wherein said active area comprises multiple regions with different materials (page 3, section [0046], Figure 6, "50, 52", re: PZT and silicon).

In regard to claim 24, Dinger discloses as set forth in claim 10 and further discloses the transducer being used to generate surface acoustic waves in an active area (page 2, section [0034], Figure 1, "3").

Regarding claim 25, Dinger discloses wherein the at least one transducer responds to at least one frequency of the modulating signals (page 2, section [0035]).

In regard to claim 26, Dinger discloses as set forth in claim 10 and further discloses wherein said apparatus comprises a second transducer (Figure 4, any of

"34"), which would inherently be electrically connected to the opposing first transducer since they operate in the same direction.

In regard to claim 31, Dinger discloses as set forth in claim 10 and further discloses wherein said at least one surface acoustic wave reflective diffractive element has an active area (Figure 6, "50"), and wherein said at least one surface acoustic wave reflective diffractive element has first and second active areas characterized by different mechanical responses (page 3, section [0046], Figure 6, "52, 56").

In regard to claim 33, Dinger discloses as set forth in claim 10 and further discloses wherein said active area is constructed and arranged to magnify the amplitude of the surface acoustic wave (page 3, section [0045], last 4 lines, Figure 6).

In regard to claim 34, Dinger discloses as set forth in claim 10 and further discloses wherein said at least one surface acoustic wave reflective diffractive element has an active area (Figure 6, "44.1, 44.2"), wherein said surface acoustic waves would be flexural waves, this being reasonably assumed from the disclosure of the surface waves being produced on very thin wafer disks (page 3, section [0046], lines 6-8).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dinger et al in view of Worchesky et al (U.S. 5,566,382).

In regard to claim 7, Dinger et al discloses a method for spatially modulating radiation (page 1, section [0001]) comprising: directing at least one radiation beam upon a reflective surface of at least one surface acoustic wave reflective diffractive element (page 2, sections [0034]-[0036], Figure 1, "3"); and driving said at least one surface acoustic reflective diffractive element with a plurality of modulating signals to generate a plurality of independently modulated output radiation beams having parameters (page 2, section [0035] and section [0039], lines 1-4, Figures 1 and 2A, "9, 11, 13"), but does not specifically disclose wherein the beam directing is with a pulsed radiation beam. Within the same field of endeavor, Worchesky et al teaches that it is well known in methods for spatially modulating radiation comprising surface acoustic wave reflective diffractive elements to comprise pulsed radiation beams (column 3, lines 47-56, Figure 5, "414").

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Dinger et al to comprise a pulsed radiation source since Worchesky et al teaches that it is well known in methods for spatially modulating radiation comprising surface acoustic wave reflective diffractive elements to comprise pulsed radiation beams.

Regarding claim 8, Worchesky et al further teaches timing the pulse of radiation to diffract from a surface acoustic wave diffractive element after a predetermined diffractive pattern has propagated to a predetermined location (column 3, line 47 – column 4, line 25).

Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dinger et al in view of Joseph (U.S. 4,250,474).

In regard to claim 23, Dinger et al discloses an apparatus for spatially modulating radiation comprising: at least one surface acoustic wave reflective diffractive element (page 2, sections [0034]-[0036], Figure 1), each element having at least one reflective surface (Figure 1, "3"), at least one transducer of surface acoustic waves (Figure 1, "5"), at least one transducer to transduce a surface acoustic wave in the surface of at least one of said surface acoustic wave reflective diffractive elements (Page 2, section [0034], Figure 1, "5") and would inherently comprise a source of a plurality of modulating signals for driving said at least one transducer, this being reasonably assumed from the surface waves being disclosed as having their frequencies varied (page 2, section 0021], last 6 lines). Dinger et al further discloses a source of at least one input radiation beam constructed and arranged so that at least a portion of the input radiation beam strikes a reflective surface of a surface acoustic wave reflective diffractive element from outside the surface of that surface acoustic wave reflective diffractive element (Figure 1, "7"), and a plurality of modulated output radiation beams modulated by respective ones of said modulating signals (page 2, section [0035] and section [0039], lines 1-4, Figures 1 and 2A, "9, 11, 13"), wherein said at least one surface acoustic wave reflective diffractive element has an active area (page 3, section [0045], Figure 5, "44.2"), wherein the transducer comprises interdigital electrodes deposited on top of a piezoelectric substrate (page 3, section [0046], Figure 5) but does not specifically disclose wherein the interdigital electrodes are irregularly spaced. Within the same field of endeavor,

Joseph teaches that it is well known in surface acoustic wave reflective diffractive spatial modulating apparatuses for interdigital electrodes to be irregularly spaced since the spacing determines which of the electrodes actively relate to any particular frequency of acoustic energy (column 2, lines 20-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the interdigital electrodes of Dinger et al to be irregularly spaced since Joseph teaches that it is well known in surface acoustic wave reflective diffractive spatial modulating apparatuses for interdigital electrodes to be irregularly spaced since the spacing determines which of the electrodes actively relate to any particular frequency of acoustic energy.

Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dinger.

In regard to claims 28 and 29, Dinger et al discloses as set forth in claim 10, but does not specifically disclose wherein said apparatus further comprises a second surface acoustic wave reflective diffractive element wherein at least one surface acoustic wave reflective diffractive element is located on the same substrate as the second surface acoustic wave reflective diffractive element and separated by a gap. Examiner takes official notice that it is well known in the art and well within the means of one of ordinary skill in the art to combine two surface acoustic wave reflective diffractive elements within the same substrate and separated by a gap.

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dinger et al in view of Wright (U.S. 4,910,839).

In regard to claim 30, Dinger discloses as set forth above in claim 10 but does not specifically disclose wherein the source of modulating signals provides radio frequency electrical signals. Within the same field of endeavor, Wright teaches that it is well known in the art of surface acoustic wave reflective diffractive apparatuses to comprise radio frequency electrical signals as the source of modulating signals (column 10, lines 41-51).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the source of modulating signals of Dinger et al to provide radio frequency electrical signals since Wright teaches that it is well known in the art of surface acoustic wave reflective diffractive apparatuses to comprise radio frequency electrical signals as the source of modulating signals.

Allowable Subject Matter

Claims 12, 13 and 27 would be allowable if rewritten or amended to overcome the objection set forth in this Office action.

The prior art fails to teach a combination of all the claimed features as presented in claims 12 and 13: an apparatus for spatially modulating radiation comprising at least one surface acoustic wave reflective element as claimed, specifically wherein said at least one surface acoustic diffractive element is positioned inside a laser cavity so as to direct the output radiation beams out of the laser cavity.

The prior art fails to teach a combination of all the claimed features as presented in claim 27, an apparatus for spatially modulating radiation comprising at least one

surface acoustic wave reflective element as claimed, specifically further comprising at least one second transducer constructed and arranged to transduce acoustic energy into electrical energy.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William C. Choi whose telephone number is (571) 272-2324. The examiner can normally be reached on Monday-Friday from about 9:00 am to 6 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Y. Epps can be reached on (571) 272-2328. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

W.C

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